

of excellent dental care, good diet, and fluoridation, the Native Americans who live in this region today have much less of a problem with dental caries.

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#### References

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2. H. E. Berryman, D. W. Owsley, A. M. Henderson, *Am. J. Phys. Anthropol.* 50, 209 (1979); D. H. Ubelaker, T. W. Phenice, W. M. Bass, *ibid.* 30, 145 (1969).

The Horowitzes suggest that, instead of altering the fluoride concentration in drinking water, it would be better to educate health professionals, industry, and the general public as a means of controlling fluoride intake. My approach is different, for the very reason the Horowitzes outline: community water fluoridation is egalitarian and largely outside the conscious control of the consumers, whereas other modes of fluoride therapy are, to use the Horowitzes' words, "not so equitable." When given a choice, the prudent health promoter will opt for the preventive measures that require the least amount of conscious cooperative behavior on the part of the consumer. There is no doubt in my mind that the most reliable means for controlling the total fluoride intake of the population is through adjustment of the concentration of fluoride in the water supply.

Let me cite an example of one difficulty with the Horowitzes' approach, again picking up on a theme in their letter. In the late 1970's, infant formula manufacturers began making formulas with essentially fluoride-free water. Milk-based formulas currently contain 0.04 to 0.08 part per million (ppm) fluoride, a truly negligible amount. However, soy-based formulas contain about 0.4 ppm of bioavailable fluoride. This product, when mixed 1:1 with fluoridated drinking water, results in the consumption of about 0.6 milligram of fluoride per day by infants using the formula. This amount exceeds the threshold for causing some fluorosis [see (24) in my article].

As another example, television adver-

tising for fluoridated dentifrices frequently shows a child placing an excessive amount of fluoridated dentifrice on his or her toothbrush. One commercial even shows a child licking the toothpaste off the end of the brush and commenting favorably about the taste.

Industry is not the only culprit. Inappropriate prescribing of dietary fluoride supplements by physicians and dentists in fluoridated communities is not uncommon.

My recommendation was not that we "tinker" with the fluoride levels in drinking waters. It was that we reassess our original definition in light of what we now know about total fluoride consumption. However, if this reassessment should point toward the desirability of reducing fluoride ingestion, fluoride in drinking water is a logical focus for our attention because of its accessibility, ease of control, and lack of reliance on individual human behavior.

Hein says that we need to maintain the current level of basic science research, while I believe that basic research has gotten ahead of clinical research to the extent that there is a "logjam" of basic research which has not been applied properly to the clinical milieu. The two positions are not incompatible.

Hein states that "none of the speakers [at the Forsyth Dental Center Conference on the declining prevalence of dental caries] and none of the 111 other scientists in attendance would identify the specific factors responsible for this decline [in dental caries prevalence]." This statement is at odds with the published proceedings of that conference (1), which include the identification by several essayists of factors that may be responsible for the decline in their particular nations or states. For instance, in Ireland, "both fluoridation and widespread use of fluoride dentifrices are cited as explanations of declining caries" (1, p. 1319). In the Netherlands, "the increased use of fluoride in different forms was undoubtedly a causative factor for the reduced caries experience" (1, p. 1324). In New Zealand, "fluoridation of water supplies and the widespread use of fluoride toothpaste are considered to be the major factors associated with the observed decline" (1, p. 1330). In Massachusetts, "Increased utilization of fluoride dentifrices and dietary fluoride supplements during the twenty-year period provides the most logical explanation for the observed decrease" (1, p. 1352). Researchers describing the same phenomenon in Denmark (1, p. 1309), Norway (1, p. 1335), Scotland (1, p. 1338), Sweden (1, p.

1344), and the United States (1, p. 1351) and the authors of a second study in Massachusetts (1, p. 1359) come to similar conclusions.

I did not state, as Hein implies, that we need to alter the level of fluoride in drinking water "in order to reduce the possibility of fluorosis." I identified the increase in dental fluorosis only as an indicator of a change in the amount of fluoride in the environment. This dental fluorosis is not "disfiguring" and is not generally discernible to the lay person.

The final paper given at the Forsyth conference was entitled "Impact of decreasing caries prevalence: Implications for dental research" by K. G. König (1, p. 1381) of the Netherlands. König made the following statement, which illustrates what I mean by increased emphasis on clinical research.

The general and specific knowledge which has been accumulated by dental research in the last decades is sufficient to prevent caries completely. However, only part of the world population has had a chance to acquire this knowledge; of those who have, only a fraction is applying it successfully. Social and behavioral sciences could greatly help to disseminate knowledge about health and increase acceptance so that it will be actually practiced by more and more people.

Hein's conference at Forsyth said it best. There is a decline in dental caries throughout the developed nations. This decline is probably caused by the increased use of fluoride in several modes. Greater emphasis on clinical, applied, social, and behavioral science research is needed to enhance the dissemination of this information and to be assured that the decline will be permanent.

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#### References

1. *J. Dent. Res.* 61 (Special Issue), 1303 (1983).

*Erratum:* In the article "Understanding nonrenewable resource supply behavior" by D. R. Bohi and M. A. Toman (25 Feb., p. 927), an error appeared in figure 1 on page 929. The axis on the right-hand side of the diagram should have been labeled "Output (thousand barrels per day)."

*Erratum:* In the announcement of the Gordon Research Conferences by A. M. Cruickshank (4 Mar., p. 1095), under the heading "Fertilization and the Activation of Development" (p. 1108), four listings under the topic "Gamete recognition and binding II" on 2 August were incorrectly printed. They should have read, "Michael G. O'Rand, (subject to be announced); Bayard Storey, 'Reactions between sperm and zona pallucida leading to fertilization in the mouse'; Bonnie S. Dunbar, (subject to be announced); Paul Wasserman, 'Egg surface glycoproteins that regulate mammalian fertilization.'"

Under the heading "Hormone Action" (p. 1112), two listings under the topic "Prolactin" on 9 August were incorrectly printed, and one was omitted. They should have read, "Henry Friesen, 'Prolactin receptors'; Paul Kelly, 'Second messenger for prolactin'; Jeffrey Rosen, 'Prolactin regulation of casein genes.'"